RESEARCH SUMMARY

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NELSON FOREST REGION

Crop-Tree Thinning of Western Larch in Southeastern British Columbia: 30-year Results

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INTRODUCTION

In the dry and transitional climatic regions of British Columbia, western larch (Larix occidentalis Nutt.) typically regenerates after fire in mixed, dense, almost even-aged stands. In such stands, larch rarely achieves its potential growth because of excessive stand density (Schmidt et al. 1976). As a result, productivity of all resource values is depressed.

High stand density affects the growth of larch as early as 9 years (Schmidt 1978). While a diameter growth response can be achieved by spacing at any age, more volume is often lost by spacing after about 25 years than can be compensated for by an increase in growth on the remaining crop trees (Schmidt et al. 1976).

This study examines the first 30 years after thinning in a larch stand in southeastern British Columbia.

PROJECT DESCRIPTION

The project was established in 1958, near Cranbrook, on a zonal site in the IDFdm2 subzone. At the time of spacing, the stand was estimated to be 31 years old. The main stand was very irregular, with densities ranging from 1090 to 38 550 stems per hectare and an overall density of 5290 stems per hectare. Twenty trees in each of six diameter classes between 2.5 and 15cm were spaced to radii of 2.4, 3.6 or 4.8m plus a control. Spacing consisted of the creation of a cleared circle around the crop tree, by the removal of all woody vegetation within the specified radius. Where possible, the selected trees were either co-dominants or dominants. There are 128 trees in the study.

Diameter and height of all trees were measured every 5 years following thinning, using a diameter tape and clinometer.

RESULTS

In the past 30 years, six trees have died, mostly in the smallest diameter classes and the closest spacings. An additional five trees in the smallest diameter classes are suffering from snow press.

Wider spacing produced a slightly lower height-to-diameter ratio. The reduced competition for the wider spaced trees presumably produced a reallocation of growth resources, benefiting diameter growth. This is not unexpected in a light-demanding species like larch. Although significant, the actual difference was small (70 cm after 30 years). Thus, although the spaced trees are taller than their unspaced counterparts, this is largely the result of the greater diameters achieved in the wider spacings.

The increase in individual tree basal area as a result of spacing was prompt and directly related to the level of spacing. The widest spacing level produced average tree growth that was about double that of a comparable tree in the control. The greatest spacing in this trial does not appear to have produced the maximum response. Schmidt and Seidel (1988) report further diameter responses in a younger stand, at spacing levels greater than those in this

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study (approximately 5.1m radius). Even though our stand was older, it is likely that greater diameter growth responses could have been achieved at even wider spacings.

Diameter gains continued for the first 15-20 years but began to decline after that. The last 5-year period (1983-88) showed a dramatic reduction in the basal area growth in all treatments (Figure 1). In the last 5 years, the periodic growth rates of the closest (control) to widest spacings were only 26, 32, 52, and 54%, respectively, of their average periodic growth for the previous 25 years.

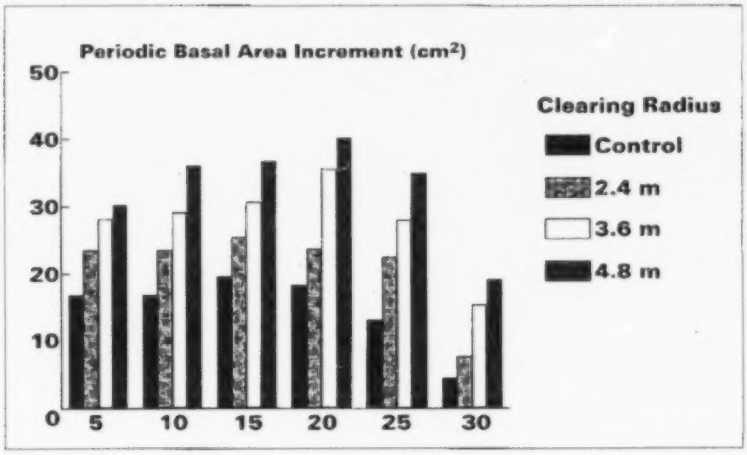

Fig. 1: Average individual tree basal area increment for the six periods in this study.

There are several possible explanations for this decline. A drier climate in recent years may have slowed growth, or the trees may have exhausted the additional growing space provided them by the spacings, though this is unlikely since the reduced growth rates occurred almost simultaneously in all treatments. The most likely explanation is the larch casebearer (Coleophora laricella Hbn.) which has been observed annually in the study area since 1968. Larch needle blight (Hypodermella laricis Tub) and the larch sawfly (Pristiphora erichsonii [Hartig]) have also been reported in the trial area during the period of this study.

CONCLUSIONS

The major effect of spacing was on diameter and, therefore, on basal area and volume growth. Response was prompt but declined dramatically after 25 years in all spacings. This decline is likely due to defoliation by the larch casebearer and other defoliators.

At 31 years of age, these trees were too old for maximum response. Larch should be thinned early, before self-pruning starts. This could be as early as 7 years.

The larger trees produced the greatest growth response. Thus, in any spacing operation, preference should be given to the larger individuals that already demonstrate better growth.

Wider spacing levels also increased growth, but the spacing level at which volume per hectare is optimized will be lower than the level at which diameter growth is maximized due to the reduced number of stems per hectare at the wider spacing.

LITERATURE CITED

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For further information, see:
Research Note No. 110.

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